

Abstract of the Disclosure

Acetolactate synthase (ALS), a key enzyme in the biosynthesis of valine, leucine and isoleucine in plants is inhibited by herbicides comprising imidazolinones. The present invention relates to *Arabidopsis thaliana* genes encoding a mutant acetolactate synthase (ALS) enzyme that is specifically resistant to imidazolinone herbicides. Exemplary of these genes are DNA sequences which encode an amino acid substitution at position 122 or an amino acid substitution at position 205 of the wild-type ALS enzyme in *Arabidopsis thaliana*, ecotype Columbia or an amino acid substitution at position 205 of the wild-type ALS enzyme in *Arabidopsis thaliana*, ecotype Landsberg *erecta*. The mutant ALS genes can be used to transform plants to herbicide resistance; in this regard, the invention also provides host cells and vectors containing the gene, which cells and vectors are useful in the transformation process. The mutant ALS genes is commercially useful, when used to impart imidazolinone resistance to a crop plant; thereby permitting the utilization of the imidazolinone or analogous herbicide as a single application at a concentration which ensures the complete or substantially complete killing of weeds, while leaving the transgenic crop plant essentially undamaged.